



**Structure for Packaging, Integrating and
Re-using IP within Tool-flows**

Synopsys Interoperability Breakfast

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SPIRIT Technical Chair

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Structure of presentation

- **SPIRIT: The Vision**
- SPIRIT Consortium: The Organisation
- SPIRIT Technical Overview and Roadmap

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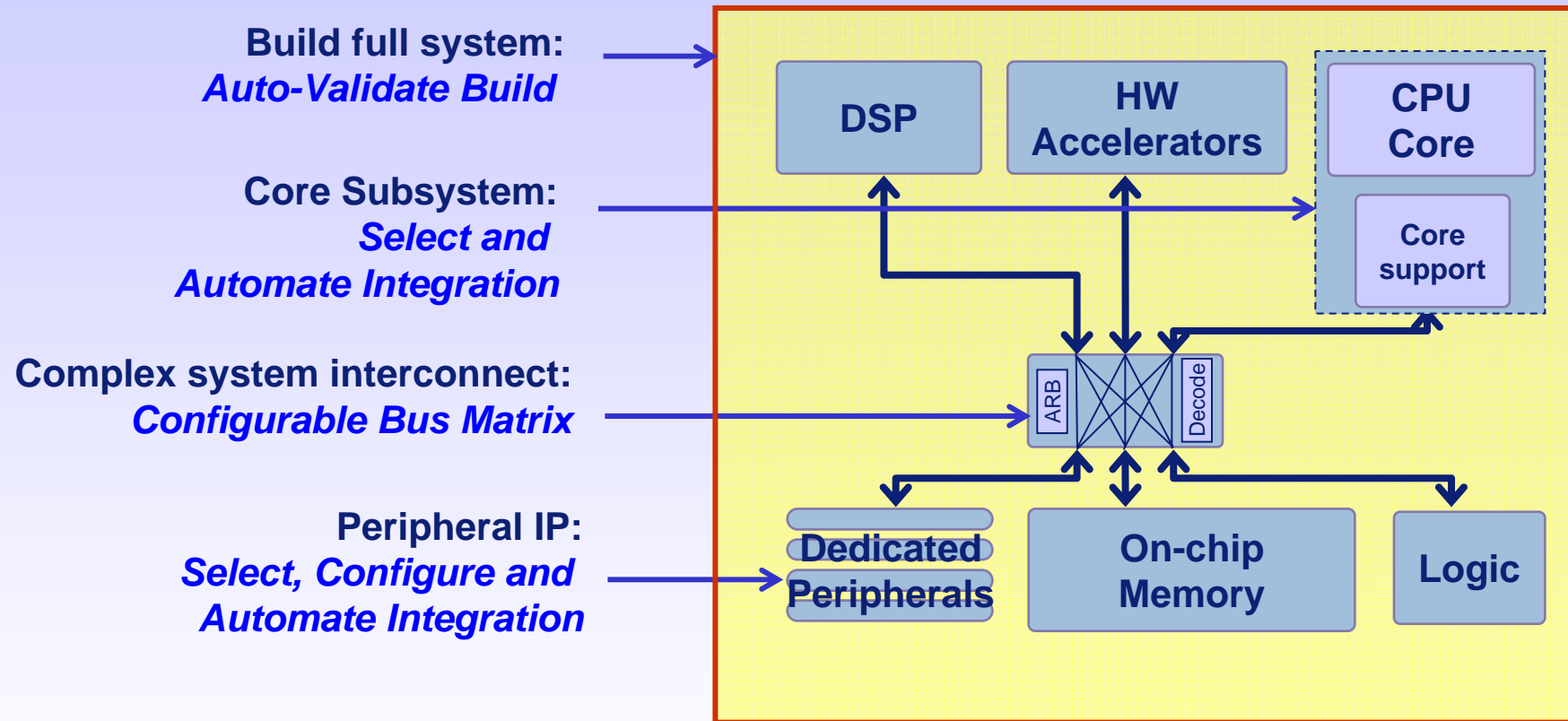
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-SPIRIT-

For advanced SoC design paradigms ..



... we need industry standards for data exchange to enable the ecosystem

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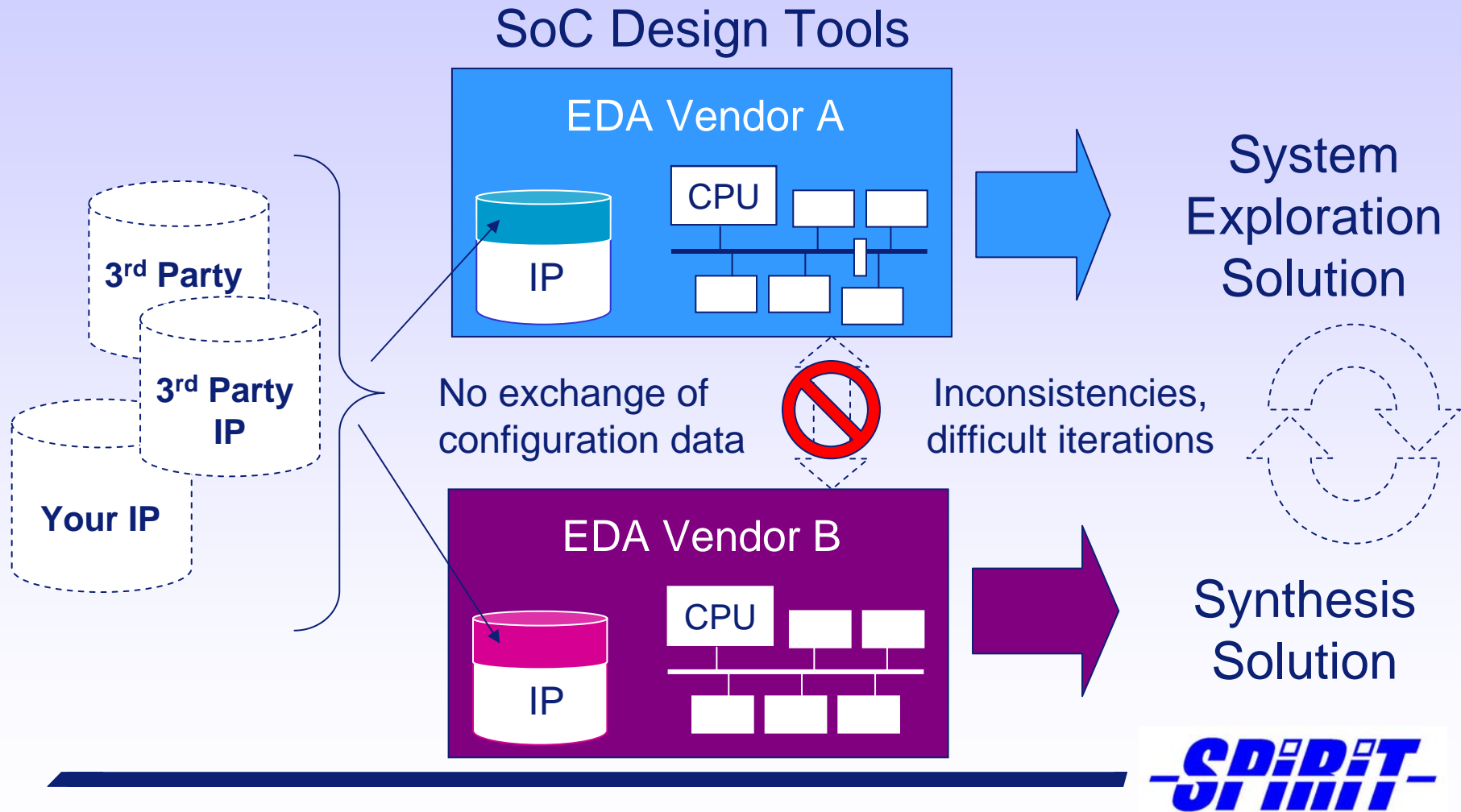
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Pre-SPIRIT: separate design threads



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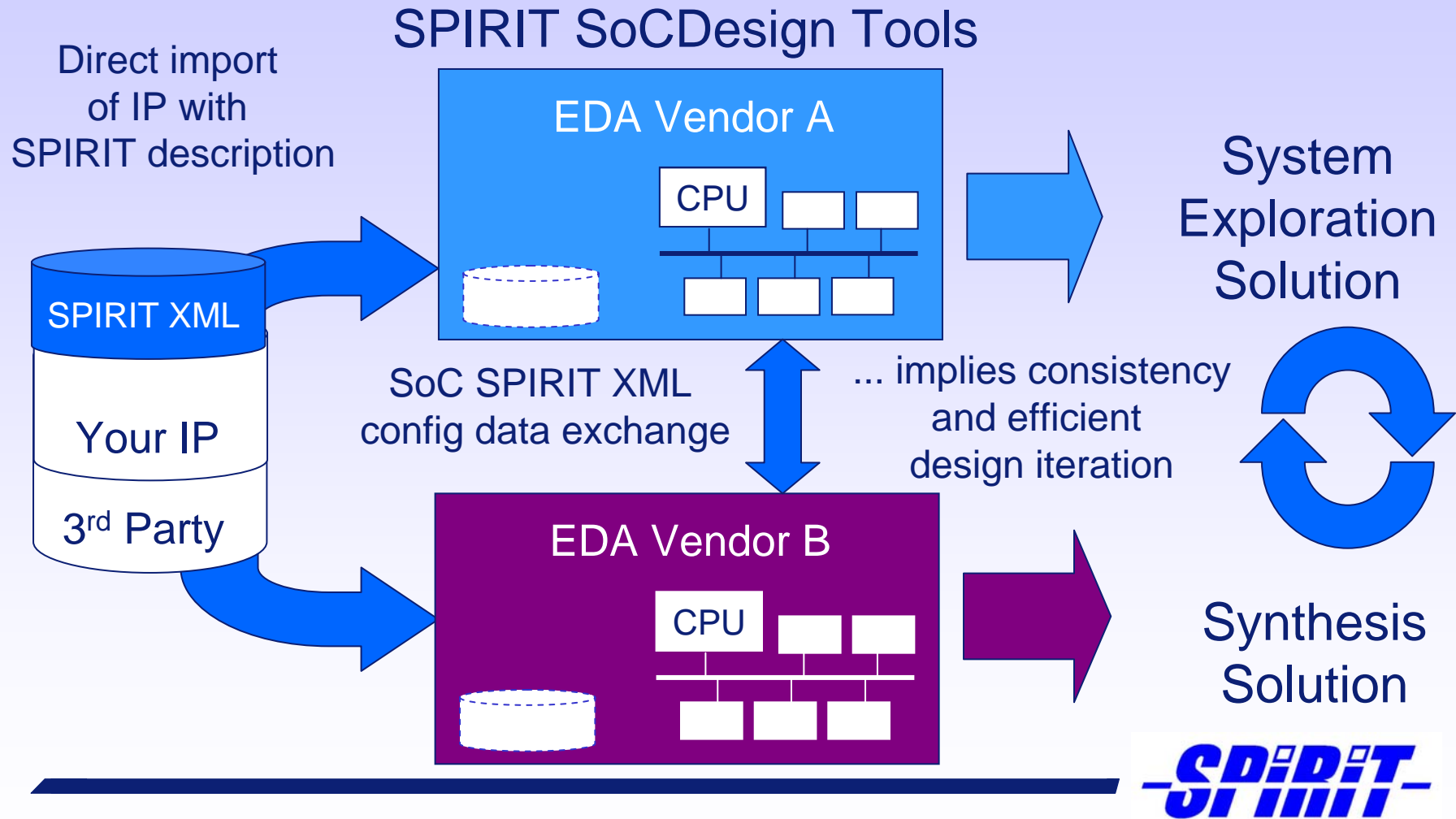
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With SPIRIT: design iteration enabled



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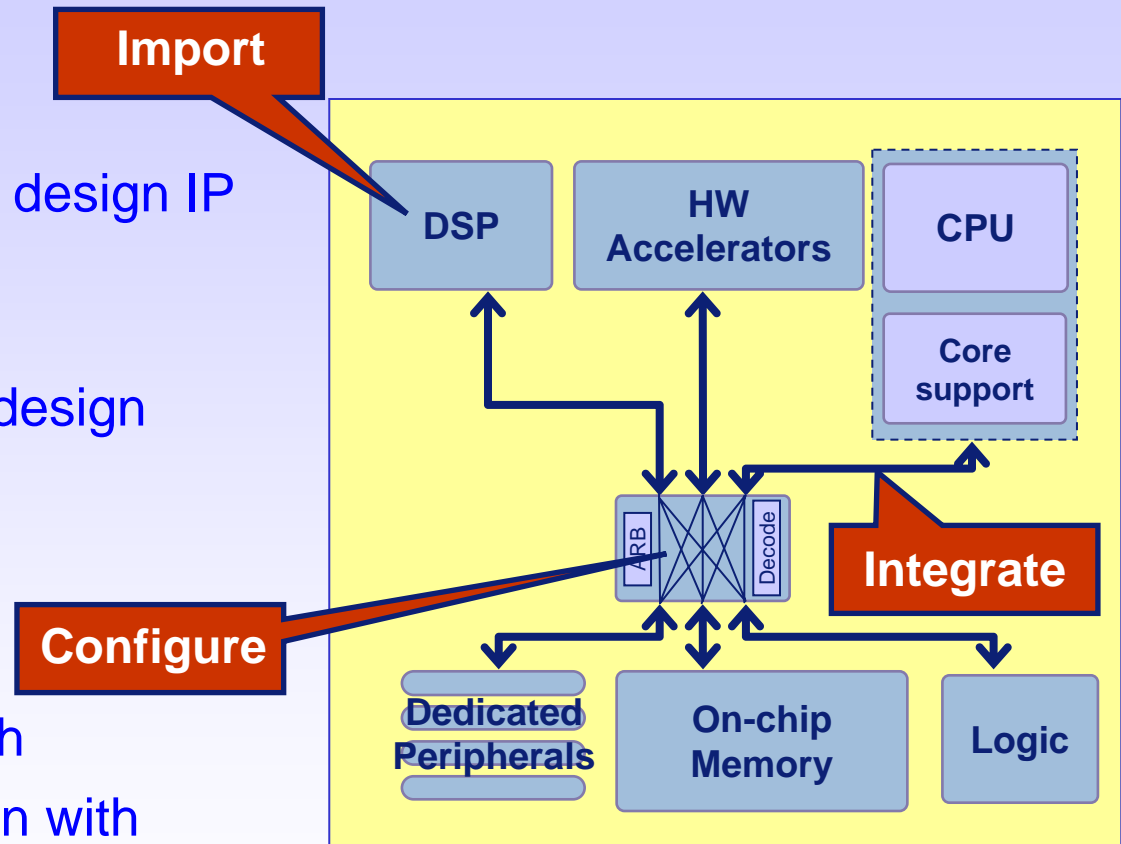
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SPIRIT

SPIRIT provides the critical standard

- **SPIRIT Meta-data:**
 - Machine-interpretable design IP
 - Specifies integration requirements
 - Consistent across all design views
- **SPIRIT generators:**
 - Point-tool launch
 - IP configuration launch
 - Interface for integration with SPIRIT compatible tools



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Why use design meta-data?

- **Relate specification to implementation**
 - Machine interpretable coupling of design views
 - e.g., Meta-data describes how verilog signal list of a design IP describes a bus interface.
- **Broad applicability**
 - Is applicable to new and legacy IP
 - No enforced design style or methodology
 - A by-product of IP import into SPIRIT compliant tools

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The SPIRIT Vision for SoC Design

- **IP shipped with machine-readable SPIRIT 'data-book'**
 - IP catalogued using SPIRIT XML meta-data
 - IP will be automatically configured and integrated into designs
- **From SPIRIT, data for all design views is generated**
 - Simulation models, documentation, tool-config., embedded SW
 - SoC configuration-data managed through project life-cycle
 - Consistency between design and verification views maintained
- **SPIRIT-enabled specialist IP and tools market emerges**
 - Point tools operate in any SPIRIT-enabled design environment
 - A rich 3rd-party IP generators market emerges

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SPIRIT Consortium Adoption Goals

- **Worldwide adoption: a single meta-data standard**
 - almost 1000 downloads to date, all regions well represented
- **Strong supply chain support (IP and EDA tools)**
 - significant downloads from over 20 major supply-chain companies
 - many have announced SPIRIT support in product
- **Broad system integrator usage**
 - significant downloads from over 20 major systems houses, and over 100 systems companies are examining the standard
 - some significant new memberships
- **Academic usage and development**
 - over 50 major academic institutes downloading

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SPIRIT Organization

- SPIRIT Chairman: Ralph von Vignau, Philips
- SPIRIT Vice-chair: Christopher Lennard, ARM
- Steering Committee: organizational decisions, approvals
- Technical Working Groups:
 - SWG: Oversees technical developments, and releases
Developed RTL schema and APIs (v1.0, v1.1)
 - EWG: ESL Technical Working Group (v2.0)
 - VWG: Verification Technical Working Group (v2.0)
- Steering Committee Members:

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SPIRIT membership is building

SPIRIT v2.0: Additional
Contributing Members

New Members:
Bluespec Inc.
Duolog Technologies Inc.
Improv Systems Inc.
Poseidon Design Systems
Quake Technologies Inc.
XLBiosim
+ 4 in pipeline

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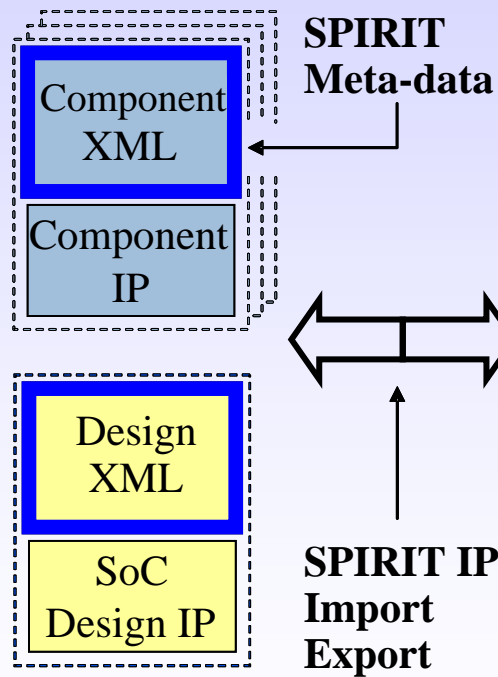
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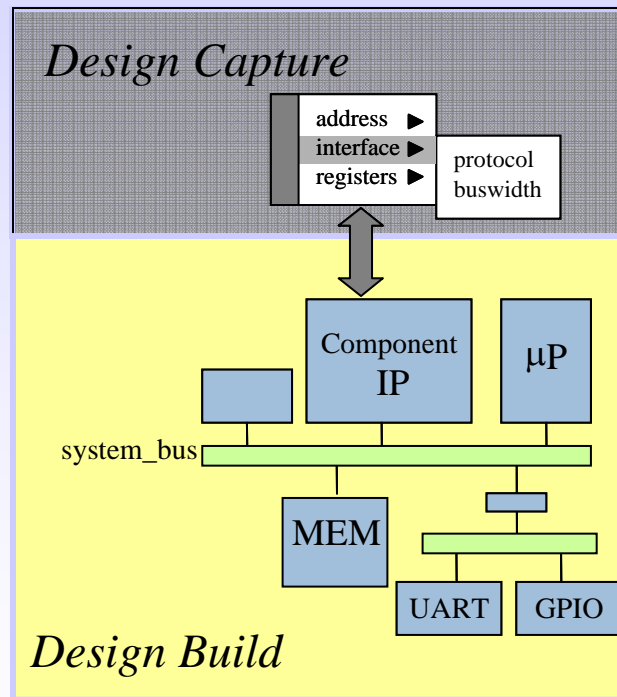
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SPIRIT v1.x Overview

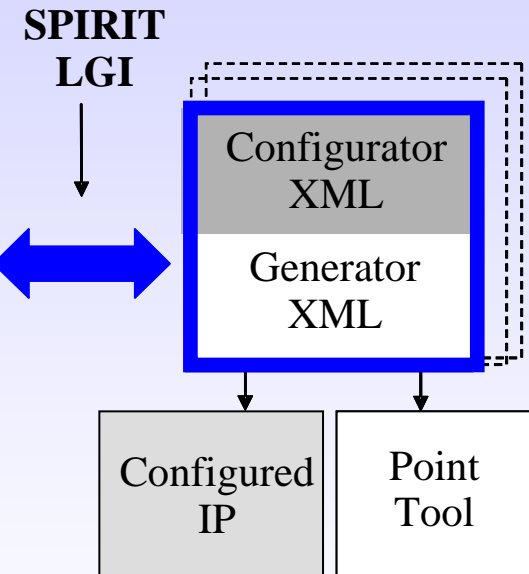
SPIRIT Compliant IP



SPIRIT Compliant SoC Design Tool



SPIRIT Compliant Generators



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Key elements of SPIRIT 1.x

- **Component & Design schema**
 - describe any IP block: cores, peripherals, buses components
 - describes any system: component instances, and connectivity
 - describe timing constraints for flow to implementation
- **PMD (platform meta data) rules**
 - describes access rights and default parameters
- **Bus definitions**
 - describe bus interface, integration requirements and defaults
- **Generator Interfaces:**
 - **LGI:** Loose Generator Interface
 - Meta-data dumping mechanism
 - **TGI:** Tight Generator Interface (Release in Q3 2005)
 - Access SPIRIT data-bases directly get and set methods



New for
SPIRIT v1.1



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SPIRIT v1.1 Compliancy

- **Compliancy Rules (same as v1.0):**
 - Parse Compliancy: can read SPIRIT XML
 - Description Compliancy: IP described using valid SPIRIT XML, and SPIRIT extensions only used for non-SPIRIT meta-data
 - Semantic Compliancy: Must adhere to SPIRIT semantic interpretation of SPIRIT XML
- **Semantic Compliancy Checker:**
 - Members using a tcl-script semantic compliancy checker
 - Completing being driven by real-world usage
 - SPIRIT v1.1 compliancy checker public release: Q3 2005



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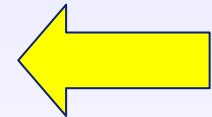
SPIRIT v2.0: Modelling and Verification

- **Build on SPIRIT v1.x to deliver an updated standard and comprehensive examples to:**
 - ensure SPIRIT can support verification and system-design model configuration and assembly requirements
 - support the consistent management of test benches and verification data in line with design configuration
 - describe configurable system-design models so that full SoC design models can be automatically built and run
 - support SoC design modelling for transactional based design, maintaining consistency between abstractions
- **Development started December 2004**
- **Validated SPIRIT v2.0 public release: December 2005**

The SPIRIT logo is written in a bold, blue, sans-serif font. The letters 'I' and 'T' are stylized with small squares above them. The logo is flanked by horizontal lines on both sides.The ARM logo consists of the letters 'ARM' in a bold, blue, sans-serif font.The Cadence logo features the word 'cadence' in a lowercase, black, sans-serif font, enclosed within a black rectangular border.The Mentor Graphics logo displays the word 'Mentor' in a red, serif font above the word 'Graphics' in a red, sans-serif font.The PHILIPS logo is written in a bold, blue, sans-serif font.The ST logo consists of the letters 'ST' in a blue, sans-serif font, with a stylized blue graphic element to the left.The SYNOPSYS logo is written in a bold, blue, sans-serif font.

SPIRIT Roadmap

- **SPIRIT launch:** DAC 2003
 - Requirements: Q4 2003
- **SPIRIT 1.0: Scope – RTL**
 - Proposed Standard (Member Review): DAC 2004
 - Validated Public Release v1.0: Dec 2004
- **SPIRIT 1.1: Scope – RTL w/ Timing Constraints & TGI**
 - ALPHA (inc. Timing Constraints) April 2005
 - BETA (inc. TGI) May 2005
 - Validated Public Release v1.1: DAC 2005
 - Full v1.1 TGI support Sept 2005
- **SPIRIT 2.0: Scope – ESL / Verification**
 - Requirement Public Release DATE 2005
 - Validated Public Release v2.0: Dec 2005



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Thank you for your attention!

The logo for the SDiDiT Consortium, featuring the letters 'SDiDiT' in a bold, blue, italicized font. The 'i's are lowercase and have a small square above them. The letters are connected, and there are horizontal lines extending from the left and right sides of the top row.

Consortium

Collaborating for
Efficient IP-Based SoC Design

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A smaller version of the SDiDiT logo, positioned at the bottom right of the slide.